High Pressure Gas Facility
at
NASA Stennis Space Center

High Pressure Gas System Ball Valve Package

Specification Number

11000-GM22

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APPROVED:

Prepared: _____ **Date:** 6/9/15
Jonathan Dickey

Design Lead: _____ **Date:** 6/9/15
Jason Richard

Systems Lead: _____ **Date:** 6/11/15
Megan Martinez

Construction Manager: _____ **Date:** 06/08/2015
Trey Hamilton

Safety Lead: _____ **Date:** 6/11/15
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GENERAL REQUIREMENTS

1.1 SUMMARY

The work to be performed under this project consists of the design, fabrication, inspection, testing, cleaning, and delivery to Stennis Space Center, Stennis, Mississippi the valves (quantity of 29) indicated in the data sheets in the Appendix.

1.2 REFERENCES

AMERICAN SOCIETY OF NON DESTRUCTIVE TESTING (ASNT)

ASNT-TC-1A	Manual of Recommended Practice

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AS5202	Bosses, Fluid Connector – Internal Straight Thread

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
BOILER AND PRESSURE VESSEL CODE

ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.9	Factory Made Wrought Steel Butt Welding Fittings
ASME B16.34	Valves – Flanged, Threaded and Welding Ends
ASME B31.3	Process Piping

NASA & SSC STANDARDS AND SPECIFICATIONS (SSC)

NASA-RPT-STD-8070-0001	Surface Cleanliness Standard for Fluid Systems for Rocket Engine Test Facilities of the NASA Rocket Propulsion Test Program

1.3 SUBMITTALS

The following shall be submitted to the Contracting Office and the Contracting Officer's Representative in sufficient detail to show full compliance with the specification:

A. Data

The Contractor shall furnish design calculations covering performance features of the valve and actuator package. Design calculations for the valve shall be submitted with the shop fabrication drawings. These are due no later than three weeks after award of the contract. Design calculations shall include:

- Actuator Sizing (specifically a force balance showing the valve can perform under full differential pressure)

B. Drawings

Shop Fabrication Drawings shall be submitted of each valve and of each shop assembly component as needed for the assembly of the valve, due no later than 6 weeks after award of the contract. Shop drawings shall show the location and details of:

- all dimensions and details of construction
- lifting points
- center of gravity (of complete valve assembly)
- support design requirements (as needed)
- bill of Materials

C. Schedules

A copy of Fabrication time and test and inspection schedules shall be submitted no later than three weeks after award of contract.

D. Statements

The Contractor shall submit the following items within three weeks after award of contract:

- Detailed drawing of valve
- Cleaning Procedures
- Hydrostatic Leak Check Procedures
- Functional Test Procedures
- Painting Specifications and Procedures (if applicable)
- Certified Welder Performance Qualifications and Procedures (if applicable)

E. Reports

Prior to shipment, the Contractor shall submit a copy of the following items:

- Mill Test Reports for all metallic components
- Hydrostatic Test Report including test set-up configuration and log of time versus pressure
- Functional Test Report
- Cleaning and Sampling Report
- Documentation showing valves are ASME B31.3 compliant

The Contracting Officer's Representative will issue a response to the contractor's submittal within 10 working days of the receipt of the submittal.

1.4 REQUIREMENTS

Each valve shall be designed, fabricated, tested, cleaned and delivered in accordance with the detailed requirements of this specification and the attached data sheets. The requirements specified herein are minimum requirements. The Contractor shall take whatever additional measures are necessary in his design, fabrication, inspection and testing to produce a valve, which will satisfactorily pass the tests specified herein without damage. Where specific requirements are set forth, and where such specific requirements depart from requirements or alternatives contained in any documents referenced herein, the specific requirements contained herein shall govern and take precedence. The general requirements for each type of valve are provided within the body of this specification with specific requirements for each valve type provided in data sheets located in the appendices.

1.5 QUALITY ASSURANCE

The Contract Administrator and Government reserve the right to inspect all work at all times during and upon completion of fabrication and to witness any or all tests. The Contractor shall cooperate fully to enable the SSC COR or Government designated representative to be present at the performance of any or all tests and any other activity as specifically requested. The Contractor shall furnish all equipment and materials for all tests except where specially stated otherwise. The Contractor shall notify the COR fourteen calendar (14) calendar days prior to performance of any and all tests.

As a minimum, the following hold points shall apply:

Item No.	Surveillance	Type
1	Government review and approval of actuator sizing calculations as well as all Radiography reader sheets	Verification
2	Cleaning & Packaging of valve for shipment	Witness
3	Hydrostatic Test	Witness
4	Functional Test (as identified in data sheets)	Witness

1.6 WELDING PROCEDURE AND WELDING OPERATOR QUALIFICATIONS

Welding procedure and welders qualifications shall be performed in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

1.7 GUARANTEE

All equipment to be furnished under this specification shall be guaranteed against defective materials, design, and workmanship for a period of five years from receipt of the valve or 1 year after first installation, whichever is shorter. Upon receipt of notice of failure of any part of the guaranteed equipment during the guarantee period, new replacement parts shall be furnished and installed promptly by the Contractor at no additional cost. The Contractor shall acknowledge his responsibility under these guarantee provisions by letter, stating the inclusive dates of the guarantee period for which the equipment and materials referred herein are guaranteed.

1.8 TESTING

All valves shall be hydrostatically tested to 1.5 times the MAWP shown on the data sheets and held for 10 minutes. The hydrostatic test pressure and test date shall be permanently marked on the valve body.

All valves shall be functionally tested per the attached data sheet.

1.9 CLEANING

Valves shall be cleaned to the level indicated on the data sheet per NASA RPT STD 8070-0001. A report showing the particulate and/or NVR sampling results must be kept and submitted at the end of the contract. After cleaning and verification of clean level, valves shall be packaged in accordance with NASA RPT STD 8070-0001.

-- End of Section –

APPENDIX A

BALL VALVES FOR GAS SERVICE

1.5" Ball Valve Data Sheet

- Locator Number: VA-202-HA
- Nominal Size: 1.5"
- Valve Type: Trunnion Ball Valve
- Maximum Allowable Working Pressure/Design Pressure: 6,000 psig
- Maximum Operating Pressure: 6,000 psig
- Temperature Rating: -20 °F to +120 °F
- Materials of Construction:
  - Body: A286 SS, 316L SS, 304L SS
  - Shaft/Disc: A286 SS, 316L SS, 304L SS
  - Seals: Viton or 100% Virgin PTFE
  - Seat: Vespel SP-21 or Peek
  - Guides: Copper Alloys, Bronze Alloys, Nickel-Copper Alloys
- End Connections: 1.5" Grayloc, GR-14 Sch 160
- Face-to-Face Dimension: 9.75"
- Service Fluid Compatibility: Air
- Service Fluid: Air
- Cleanliness Level: Level 400A per NASA RPT STD 8070-0001
- Minimum Required Cv: 57
- Actuator Type: Hand wheel, gear drive, and top mounted red/green visual position indicator
- External Operating environment of valve will be +20°F to +120°F and 100% relative humidity
- Valve will be subject to deluge water spray
- All valves shall have material certifications traceable by manufacturer's serial number.
- Valve must have lifting lugs.
- No metric threads are allowed
- All welds must meet ASME Boiler and Pressure Vessel Code, Div. 1 sections II, V, VIII, IX. Welds must be backed with Argon only, no Nitrogen.
- The Government reserves the right to inspect any or all component piece parts for cleanliness and workmanship prior to assembly with advanced two week notice.
- Valve must be hydrostatically proof tested to 1.5 times design pressure rating and held for a minimum of 10 minutes.
- Valve shall be permanently marked in the following way:

  Locator Number
  Manufacturer
  Model #
  Serial #
  Nominal Size
  MAWP
  Temperature Rating
  Max Cv
  Proof Test Type / Pressure / Date
  Weight
  Flow Direction Arrow

- Manufacturer must supply any special tools needed for disassembly or reassembly of valve
- Manufacturer shall supply two (2) sets of repair softgoods with delivery of valve. A softgood set shall be defined as any and all non-metallic parts, plastic parts, parts recommended to be changed every time the valve is reassembled, and parts that experience severe wear.
- Valve shall be functionally internally leak tested in primary direction of flow with gaseous nitrogen at Maximum Operating Pressure for no less than 3 minutes. Acceptable leakage is no more than 1 standard cubic centimeter per minute per inch of nominal valve size. No external leakage is acceptable.
- Along with valve, delivery shall include detailed drawings of valve, test procedures, and material certifications for both metal parts and soft goods.

2" Ball Valve Data Sheet

- Locator Number: VA-5A3431-HE, VA-5A3432-HE, VA-5A3433-HE, VA-7A1556-HE, VA-7A1557-HE, VA-18A1001-HE, VA-168-HE, VA-8G01-HE, VA-8G02-HE, VA-5A3441-GN, VA-18A1003GN, VA-8G01-GN, VA-8G02-GN, VA-283-GN, VA-284-GN
- Nominal Size: 2"
- Valve Type: Trunnion Ball Valve
- Maximum Allowable Working Pressure/Design Pressure: 6,000 psig
- Maximum Operating Pressure: 6,000 psig
- Temperature Rating: -20 °F to +120 °F
- Materials of Construction:
  - Body: A286 SS, 316L SS, 304L SS
  - Shaft/Disc: A286 SS, 316L SS, 304L SS
  - Seals: Viton or 100% Virgin PTFE
  - Seat: Vespel SP-21 or PEEK
  - Guides: Copper Alloys, Bronze Alloys, Nickel-Copper Alloys
- End Connections: 2" Grayloc, GR-14 Sch XXS
- Face-to-Face Dimension: 11.75"
- Service Fluid Compatibility: Gaseous Nitrogen, Gaseous Helium, and Air
- Service Fluid: Gaseous Nitrogen, Gaseous Helium, or Air
- Cleanliness Level: Level 400A per NASA RPT STD 8070-0001
- Minimum Required Cv: 133
- Actuator Type: Hand wheel, gear drive, and top mounted visual Red/Green position indicator
- External Operating environment of valve will be +20°F to +120°F and 100% relative humidity
- Valve will be subject to deluge water spray
- All valves shall have material certifications traceable by manufacturer's serial number.
- Valve must have lifting lugs.
- No metric threads are allowed
- All welds must meet ASME Boiler and Pressure Vessel Code, Div. 1 sections II, V, VIII, IX. Welds must be backed with Argon only, no Nitrogen.
- The Government reserves the right to inspect any or all component piece parts for cleanliness and workmanship prior to assembly with advanced two week notice.
- Valve must be hydrostatically proof tested to 1.5 times design pressure rating and held for a minimum of 10 minutes.
- Valve shall be permanently marked in the following way:
  - Locator Number
  - Manufacturer
  - Model #
  - Serial #
  - Nominal Size
  - MAWP
  - Temperature Rating
  - Max Cv
  - Proof Test Type / Pressure / Date
  - Weight
  - Flow Direction Arrow
- Manufacturer must supply any special tools needed for disassembly or reassembly of valve
- Manufacturer shall supply two (2) sets of repair softgoods with delivery of valve. A softgood set shall be defined as any and all non-metallic parts, plastic parts, parts recommended to be changed every time the valve is reassembled, and parts that experience severe wear.
- Valve shall be functionally internally leak tested in primary direction of flow with gaseous nitrogen at Maximum Operating Pressure for no less than 3 minutes. Acceptable leakage is no more than 1 standard cubic centimeter per minute per inch of nominal valve size. No external leakage is acceptable.
- Along with valve, delivery shall include detailed drawings of valve, test procedures, and material certifications for both metal parts and soft goods.

2" Ball Valve Data Sheet

- Locator Number: VA-7A1568-HA
- Nominal Size: 2"
- Valve Type: Trunnion Ball Valve
- Maximum Allowable Working Pressure/Design Pressure: 6,000 psig
- Maximum Operating Pressure: 6,000 psig
- Temperature Rating: -20 °F to +120 °F
- Materials of Construction:
  - Body: A286 SS, 316L SS, 304L SS
  - Shaft/Disc: A286 SS, 316L SS, 304L SS
  - Seals: Viton or 100% Virgin PTFE
  - Seat: Vespel SP-21 or PEEK
  - Guides: Copper Alloys, Bronze Alloys, Nickel-Copper Alloys
- End Connections: 2" Grayloc, GR-20 Sch 160
- Face-to-Face Dimension: 11.75"
- Service Fluid Compatibility: Gaseous Nitrogen, Gaseous Helium, and Air
- Service Fluid: Gaseous Nitrogen, Gaseous Helium, or Air
- Cleanliness Level: Level 400A per NASA RPT STD 8070-0001
- Minimum Required Cv: 133
- Actuator Type: Hand wheel, gear drive, and top mounted visual Red/Green position indicator
- External Operating environment of valve will be +20°F to +120°F and 100% relative humidity
- Valve will be subject to deluge water spray
- All valves shall have material certifications traceable by manufacturer's serial number.
- Valve must have lifting lugs.
- No metric threads are allowed
- All welds must meet ASME Boiler and Pressure Vessel Code, Div. 1 sections II, V, VIII, IX. Welds must be backed with Argon only, no Nitrogen.
- The Government reserves the right to inspect any or all component piece parts for cleanliness and workmanship prior to assembly with advanced two week notice.
- Valve must be hydrostatically proof tested to 1.5 times design pressure rating and held for a minimum of 10 minutes.
- Valve shall be permanently marked in the following way:
  - Locator Number
  - Manufacturer
  - Model #
  - Serial #
  - Nominal Size
  - MAWP
  - Temperature Rating
  - Max Cv
  - Proof Test Type / Pressure / Date
  - Weight
  - Flow Direction Arrow
- Manufacturer must supply any special tools needed for disassembly or reassembly of valve
- Manufacturer shall supply two (2) sets of repair softgoods with delivery of valve. A softgood set shall be defined as any and all non-metallic parts, plastic parts, parts recommended to be changed every time the valve is reassembled, and parts that experience severe wear.
- Valve shall be functionally internally leak tested in primary direction of flow with gaseous nitrogen at Maximum Operating Pressure for no less than 3 minutes. Acceptable leakage is no more than 1 standard cubic centimeter per minute per inch of nominal valve size. No external leakage is acceptable.
- Along with valve, delivery shall include detailed drawings of valve, test procedures, and material certifications for both metal parts and soft goods.

3" Ball Valve Data Sheet

- Locator Number: VA-5A3449-HA, VA-5A3450-HA, VA-5A3451-HA, VA-7A1569-HA, VA-3A1415-HA, VA-18A1005-HA, VA-147-HA
- Nominal Size: 3"
- Valve Type: Trunnion Ball Valve
- Maximum Allowable Working Pressure/Design Pressure: 6,000 psig
- Maximum Operating Pressure: 6,000 psig
- Temperature Rating: -20 °F to +120 °F
- Materials of Construction:
  - Body: A286 SS, 316L SS, 304L SS
  - Shaft/Disc: A286 SS, 316L SS, 304L SS
  - Seals: Viton or 100% Virgin PTFE
  - Seat: Vespel SP-21 or PEEK
  - Guides: Copper Alloys, Bronze Alloys, Nickel-Copper Alloys
- End Connections: 3" Grayloc, GR-25 Sch 160
- Face-to-Face Dimension: 16.25"
- Service Fluid Compatibility: Gaseous Nitrogen, Gaseous Helium, and Air
- Service Fluid: Gaseous Nitrogen, Gaseous Helium, or Air
- Cleanliness Level: Level 400A per NASA RPT STD 8070-0001
- Minimum Required Cv: 320
- Actuator Type: Hand wheel, gear drive, and top mounted visual Red/Green position indicator
- External Operating environment of valve will be +20°F to +120°F and 100% relative humidity
- Valve will be subject to deluge water spray
- All valves shall have material certifications traceable by manufacturer's serial number.
- Valve must have lifting lugs.
- No metric threads are allowed
- All welds must meet ASME Boiler and Pressure Vessel Code, Div. 1 sections II, V, VIII, IX. Welds must be backed with Argon only, no Nitrogen.
- The Government reserves the right to inspect any or all component piece parts for cleanliness and workmanship prior to assembly with advanced two week notice.
- Valve must be hydrostatically proof tested to 1.5 times design pressure rating and held for a minimum of 10 minutes.
- Valve shall be permanently marked in the following way:
  - Locator Number
  - Manufacturer
  - Model #
  - Serial #
  - Nominal Size
  - MAWP
  - Temperature Rating
  - Max Cv
  - Proof Test Type / Pressure / Date
  - Weight
  - Flow Direction Arrow
- Manufacturer must supply any special tools needed for disassembly or reassembly of valve
- Manufacturer shall supply two (2) sets of repair softgoods with delivery of valve. A softgood set shall be defined as any and all non-metallic parts, plastic parts, parts recommended to be changed every time the valve is reassembled, and parts that experience severe wear.
- Valve shall be functionally internally leak tested in primary direction of flow with gaseous nitrogen at Maximum Operating Pressure for no less than 3 minutes. Acceptable leakage is no more than 1 standard cubic centimeter per minute per inch of nominal valve size. No external leakage is acceptable.
- Along with valve, delivery shall include detailed drawings of valve, test procedures, and material certifications for both metal parts and soft goods.

4" Ball Valve Data Sheet

- Locator Number: VA-5A3440-GN, VA-5A3442-GN, VA-7A1562-GN, VA-7A1563-GN, VA-5S67-GN
- Nominal Size: 4"
- Valve Type: Trunnion Ball Valve
- Maximum Allowable Working Pressure/Design Pressure: 6,000 psig
- Maximum Operating Pressure: 6,000 psig
- Temperature Rating: -20 °F to +120 °F
- Materials of Construction:
  - Body: A286 SS, 316L SS, 304L SS
  - Shaft/Disc: A286 SS, 316L SS, 304L SS
  - Seals: Viton or 100% Virgin PTFE
  - Seat: Vespel SP-21 or PEEK
  - Guides: Copper Alloys, Bronze Alloys, Nickel-Copper Alloys
- End Connections: 4" Grayloc, GR-31 Sch XXS
- Face-to-Face Dimension: 23.75"
- Service Fluid Compatibility: Gaseous Nitrogen, Gaseous Helium, and Air
- Service Fluid: Gaseous Nitrogen, Gaseous Helium, or Air
- Cleanliness Level: Level 400A per NASA RPT STD 8070-0001
- Minimum Required Cv: 450
- Actuator Type: Hand wheel, gear drive, and top mounted visual Red/Green position indicator
- External Operating environment of valve will be +20°F to +120°F and 100% relative humidity
- Valve will be subject to deluge water spray
- All valves shall have material certifications traceable by manufacturer's serial number.
- Valve must have lifting lugs.
- No metric threads are allowed
- All welds must meet ASME Boiler and Pressure Vessel Code, Div. 1 sections II, V, VIII, IX. Welds must be backed with Argon only, no Nitrogen.
- The Government reserves the right to inspect any or all component piece parts for cleanliness and workmanship prior to assembly with advanced two week notice.
- Valve must be hydrostatically proof tested to 1.5 times design pressure rating and held for a minimum of 10 minutes.
- Valve shall be permanently marked in the following way:
  - Locator Number
  - Manufacturer
  - Model #
  - Serial #
  - Nominal Size
  - MAWP
  - Temperature Rating
  - Max Cv
  - Proof Test Type / Pressure / Date
  - Weight
  - Flow Direction Arrow
- Manufacturer must supply any special tools needed for disassembly or reassembly of valve
- Manufacturer shall supply two (2) sets of repair softgoods with delivery of valve. A softgood set shall be defined as any and all non-metallic parts, plastic parts, parts recommended to be changed every time the valve is reassembled, and parts that experience severe wear.
- Valve shall be functionally internally leak tested in primary direction of flow with gaseous nitrogen at Maximum Operating Pressure for no less than 3 minutes. Acceptable leakage is no more than 1 standard cubic centimeter per minute per inch of nominal valve size. No external leakage is acceptable.
- Along with valve, delivery shall include detailed drawings of valve, test procedures, and material certifications for both metal parts and soft goods.

APPENDIX B1

NASA RPT-STD-8070-0001

SURFACE CLEANLINESS STANDARD FOR FLUID SYSTEMS FOR ROCKET ENGINE TEST FACILITIES OF THE NASA ROCKET PROPULSION TEST PROGRAM